

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

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| Applicant's or agent's file reference FP20791 | FOR FURTHER ACTION See Form PCT/IPEA/416 | |
| International application No. PCT/AU2004/001642 | International filing date (day/month/year) 26 November 2004 | Priority date (day/month/year) 9 December 2003 |
| International Patent Classification (IPC) or national classification and IPC Int. Cl. B63B 59/08 (2006.01) | | |
| Applicant JOHNSON, Keith et al | | |

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
 - a. ☒ (sent to the applicant and to the International Bureau) a total of 10 sheets, as follows:
 - ☐ sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
 - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
 - b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or table related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
4. This report contains indications relating to the following items:

| | |
|--------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> Box No. I | Basis of the report |
| <input type="checkbox"/> Box No. II | Priority |
| <input type="checkbox"/> Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| <input type="checkbox"/> Box No. IV | Lack of unity of invention |
| <input checked="" type="checkbox"/> Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/> Box No. VI | Certain documents cited |
| <input type="checkbox"/> Box No. VII | Certain defects in the international application |
| <input checked="" type="checkbox"/> Box No. VIII | Certain observations on the international application |

| | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| Date of submission of the demand 8 July 2005 | Date of completion of this report 27 March 2006 |
| Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. (02) 6285 3929 | Authorized Officer S.J. DESCHANEL Telephone No. (02) 6283 2368 |

Box No. I **Basis of the report**

1. With regard to the language, this report is based on:

- ☒ The international application in the language in which it was filed
- ☐ A translation of the international application into _____, which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3(a) and 23.1 (b))
 - ☐ publication of the international application (under Rule 12.4(a))
 - ☐ international preliminary examination (Rules 55.2(a) and/or 55.3(a))

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

- ☐ the international application as originally filed/furnished
- ☒ the description:
pages 1, 2, 7-16 as originally filed/furnished
pages* 3-6A received by this Authority on 12 January 2006 with the letter of 12 January 2006
pages* received by this Authority on with the letter of
- ☒ the claims:
pages as originally filed/furnished
pages* as amended (together with any statement) under Article 19
pages* 17-21 received by this Authority on 12 January 2006 with the letter of 12 January 2006
pages* received by this Authority on with the letter of
- ☒ the drawings:
pages 1/5-5/5 as originally filed/furnished
pages* received by this Authority on with the letter of
pages* received by this Authority on with the letter of

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to the sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to the sequence listing (*specify*):

* If item 4 applies, some or all of those sheets may be marked "superseded."

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | |
|-------------------------------|--------------|-----|
| Novelty (N) | Claims 1-26 | YES |
| | Claims 27-28 | NO |
| Inventive step (IS) | Claims 1-26 | YES |
| | Claims 27-28 | NO |
| Industrial applicability (IA) | Claims 1-28 | YES |
| | Claims | NO |

2. Citations and explanations (Rule 70.7)

D1: US 5389266

D2: FR 2700240

D3: FR 2705531

D4: JP 08154559

Novelty (N) claims 1-28

Claims 1-26:

No individual citation or obvious combination of citations discloses a method/apparatus for treating marine growth on a surface as characterised in claims 1-26.

Claims 27-28:

Each of documents D1-D4 discloses an apparatus/method for treating marine growth on a surface as characterised in claims 27-28. D3, for example, discloses a moveable heated housing (26) for the treatment of algae by means of steam.

Inventive step (IS) claims 1-28

As above

All claims meet the requirements of industrial applicability.

Box No. VIII **Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

There is no continuity between page 2 and new page 3. It would appear that the first line of page 3 is missing.

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amount of energy that will be required to heat all the water in a chamber surrounding a large hull may be prohibitive.

Soviet patent publication no. SU 119-924A discloses a method of treating algae on a hull by, firstly, shrouding at least part of the hull in an insulating jacket and then heating the hull from a heat exchanger fitted to the inside of the hull. The heat from the hull is transferred through to the algal growth. Once the algae has been killed, the insulating jacket may be removed.

This arrangement requires the positioning of an insulating jacket about a hull, which may be difficult (particularly for large vessels). It also further supposes that there is access to the inside of the hull to heat the inside of the hull so that the heat is transferred to the outside of the hull. It may be difficult in many vessels to obtain access to enough of the inside of the hull to allow effective treatment of the algae.

Summary of the Invention

In accordance with a first aspect, the present invention provides a method of treating marine growth on a surface, including the steps of confining a volume adjacent a portion of the surface, introducing a heated fluid into the volume to heat the marine growth, moving the confined volume over the surface to treat other portions of the surface, and retaining the confined volume adjacent the surface regardless of the orientation of the surface.

Note that the term "marine growth", as used in this document, covers any animal or vegetable matter that may grow on any water-going object and is not limited to

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organisms which only occur in the sea. The term also includes organisms which occur in inland waterways and lakes.

In an embodiment, the heated fluid is at a
5 temperature sufficient to kill the marine growth.

In an embodiment, the fluid is heated remotely and passed into the volume from the remote location. Heated fluid may be exhausted from the confined volume as further heated fluid is introduced to the confined volume. The
10 heated fluid may be exhausted into the surrounding environment.

In an embodiment, a depth dimension of the confined volume is relatively small in magnitude. The heated fluid introduced into the confined volume may form a layer over
15 the portion of the surface, the layer being of relatively small thickness. Advantageously, this is energy efficient as it means that the amount of heated fluid required to treat the surface is minimised, and therefore the amount of energy utilised is minimised. The actual depth
20 dimension will in many cases depend upon the magnitude of the confined volume which may vary from application to application. In the embodiment, however, the depth dimension may be in a range of 2-50mm, in an alternative embodiment in a range of 2-15mm, in a further alternative
25 embodiment in a range of 2-10mm.

The method includes the step of retaining the confined volume adjacent the surface. The volume is retained regardless of the orientation of the surface. If the surface is a ship's hull, for example, the hull will
30 usually be orientated facing sideways or downwards into the water and the confined volume is retained adjacent the hull. In an embodiment, magnetism is used to retain the volume adjacent the surface.

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In an embodiment, the confined volume is moved over the surface it is conformed to the shape of the surface. If the shape is curved, for example, the confined volume may conform with the curved shape, so as to maintain the
5 volume adjacent the surface.

In an embodiment, the method may be applied to treat a surface in situ. For example, if the surface is a ship's hull, then the method may be applied to treat the ship's hull below the water line.

10 In accordance with a second aspect, the present invention provides an apparatus for treating marine growth on a surface, including a confinement arrangement arranged to confine a volume adjacent a portion of the surface, the confinement arrangement being provided with an entry port
15 arranged to enable introduction of a heated fluid to the volume, the confinement arrangement being movable over the surface to enable treatment of other portions of the surface, and the confinement arrangement further including a retaining means which is arranged to retain the
20 confinement arrangement proximate the surface so that the volume remains adjacent the surface, regardless of the orientation of the surface.

The confinement arrangement is provided with a retaining means which is arranged to retain the
25 confinement arrangement proximate the surface so that the volume remains adjacent the surface. In one embodiment, the retaining means includes one or more magnets mounted to the confinement arrangement.

In an embodiment, an exhaust means enables heated
30 fluid that has been introduced into the volume to be exhausted from the volume. The exhaust means may exhaust the heated fluid into the surrounding environment. In an

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embodiment, the exhaust means is a flexible seal which borders the confinement arrangement.

5 In an embodiment, the confinement arrangement is in the form of a cover having a back and sides and an open face, between them forming a cavity. The open face is arranged to be positioned against the surface to be treated, edges of the sides abutting the surface. The confined volume is defined within the cavity within the cover. The sides, in an embodiment, are formed at least
10 partially of a flexible skirt which forms a loose seal against the surface in operation. In an embodiment, the thickness of the cover is of relatively small magnitude so that the volume of water required to treat the area is relatively low. The water may form a layer over the
15 portion of the surface being treated.

In an embodiment, the confinement arrangement is arranged to conform with the shape of the surface as it is moved over the surface. In one embodiment, where the confinement arrangement is in the form of a cover, the
20 cover is flexible so that it can conform with, for example, a curved surface such as the hull of a water-going vessel. In one embodiment, the cover is made of a number of plates linked together so that they can move relative to each other so that overall the cover is
25 flexible and able to conform with an uneven surface.

In accordance with a third aspect, the present invention provides an apparatus for treating marine growth on a surface, including a housing for mounting a heating means to enable heating of a portion of the surface, and a
30 retaining means arranged to retain the housing proximate the surface, the housing arrangement being moveable over

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the surface to enable treatment of other portions of the surface.

In an embodiment, the heating means may include a heat exchanger. In an embodiment, the retaining means

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CLAIMS

1. A method of treating marine growth on a surface, including the steps of confining a volume adjacent a portion of the surface, introducing a heated fluid into the volume to heat the marine growth, moving the confined volume over the surface to treat other portions of the surface, and retaining the confined volume adjacent the surface regardless of the orientation of the surface.
2. A method in accordance with Claim 1, wherein the step of retaining the volume adjacent the surface is carried out utilising magnetism.
3. A method in accordance with any one of the preceding claims, including the further step of exhausting heated fluid from the confined volume as further heated fluid is introduced to the confined volume.
4. A method in accordance with Claim 3, wherein the heated fluid is exhausted into the surrounding environment.
5. A method in accordance with any one of the preceding claims, wherein the confined volume has a relatively small depth dimension.
6. A method in accordance with Claim 5, wherein the heated fluid forms a layer over the portion of the surface.

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7. A method in accordance with Claim 6, wherein the depth dimension of the confined volume is in the range of 2 to 50mm.

5 8. A method in accordance with Claim 7, wherein the depth dimension is in the range of 2 to 15mm.

9. A method in accordance with Claim 8, wherein the depth dimension is in the range of 2 to 10mm.

10

10. A method in accordance with any one of the preceding claims, including the further step of varying the temperature of the heated fluid during treatment, whereby to determine the most effective temperature.

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11. A method in accordance with any one of the preceding claims, including the further step of varying a rate of introduction of the heated fluid during treatment, whereby to determine the most effective rate.

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12. A method in accordance with any one of the preceding claims, wherein the surface is a surface of a hull of a water-going craft.

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13. A method in accordance with Claim 12, wherein the treatment is carried out under the water line of the craft while the craft is in the water.

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14. A method in accordance with any one of the preceding claims, comprising the further step of conforming the confined volume to the shape of the surface as the confined volume is moved over the surface.

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15. An apparatus for treating marine growth on a surface, including a confinement arrangement arranged to confine a volume adjacent a portion of the surface, the confinement arrangement being provided with an entry port
5 arranged to enable introduction of a heated fluid to the volume, the confinement arrangement being movable over the surface to enable treatment of other portions of the surface, and the confinement arrangement further including a retaining means which is arranged to retain the
10 confinement arrangement proximate the surface so that the volume remains adjacent the surface, regardless of the orientation of the surface.

16. An apparatus in accordance with Claim 15, wherein the
15 retaining means includes one or more magnets mounted to the confinement arrangement.

17. An apparatus in accordance with claims 15 or 16, the confinement arrangement further including an exhaust means
20 enabling heated fluid that is being introduced into the volume to be exhausted from the volume.

18. An apparatus in accordance with Claim 17, the exhaust means including a flexible seal which borders the
25 confinement arrangement.

19. An apparatus in accordance with any one of claims 15 to 18, the confinement arrangement further being arranged to conform with the shape of the surface as it is moved
30 over the surface.

20. An apparatus in accordance with Claim 19, wherein the confinement arrangement includes a flexible cover.

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21. An apparatus in accordance with Claim 20, wherein the flexible cover includes a number of relatively rigid components linked together so that they can move relative to each other to facilitate flexibility of the cover.

22. An apparatus in accordance with any one of Claims 15 to 21, wherein the confinement arrangement is such that the confined volume has a relatively small depth dimension.

23. An apparatus in accordance with Claim 22, wherein the confinement arrangement is such that the heated fluid introduced into the confined volume forms a layer over the portion of the surface.

24. An apparatus in accordance with Claim 23, wherein the depth dimension is in a range of 2 to 50mm.

25. An apparatus in accordance with Claim 24, wherein the depth dimension is in a range of 2 to 15mm.

26. An apparatus in accordance with Claim 25, wherein the depth dimension is in a range of 2 to 10mm.

27. An apparatus for treating marine growth on a surface, including a housing for mounting a heating means to enable heating of a portion of the surface, and a retaining means arranged to retain the housing proximate the surface, the housing arrangement being moveable over the surface to enable treatment of other portions of the surface.

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28. A method of treating marine growth on a surface, including the steps of utilising a heating arrangement to heat a portion of the surface, retaining the heating arrangement against the surface and moving the heating arrangement over the surface to treat other portions of the surface.
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